

# Claims

[c1] What is claimed is:

1.A carrier recovery system comprising:

an in-phase mixer for mixing an incoming signal with an in-phase reference signal to produce an in-phase baseband signal;

a quadrature-phase mixer for mixing the incoming signal with a quadrature-phase reference signal to produce a quadrature-phase baseband signal;

a DC detector for measuring a DC offset of the quadrature-phase baseband signal; and

a frequency synthesizer for generating the in-phase reference signal and the quadrature-phase reference signal according to the DC offset measured by the DC detector.

[c2] 2.The carrier recovery system of claim 1, wherein the carrier recover system locks the quadrature-phase reference signal and the in-phase reference signal to a selected channel in an Advanced Television Systems Committee (ATSC) digital television (DTV) receiver.

[c3] 3.The carrier recovery system of claim 1, wherein the incoming signal corresponds to a received vestigial sideband (VSB) signal.

- [c4] 4.The carrier recovery system of claim 1, wherein the frequency synthesizer generates the in-phase reference signal and the quadrature-phase reference signal to minimize the DC offset of the quadrature-phase baseband signal.
- [c5] 5.The carrier recovery system of claim 1, wherein the quadrature-phase mixer comprises a first low-pass filter receiving the quadrature-phase baseband signal for filtering out the high frequency term of the quadrature-phase baseband signal.
- [c6] 6.The carrier recovery system of claim 1, wherein the frequency synthesizer comprises a second low-pass filter coupled to the DC detector and the frequency synthesizer.
- [c7] 7.The carrier recovery system of claim 6, wherein the second low-pass filter is a loop filter.
- [c8] 8.The carrier recovery system of claim 1, wherein the DC detector comprises:  
an adder for adding the quadrature-phase baseband signal to a feedback signal for producing an added value;  
a delay unit coupled to the adder for generating an output being the added value delayed by a predetermined time; and

a multiplier coupled to the delay unit for multiplying the output of the delay unit by a predetermined coefficient to produce the feedback signal.

- [c9] 9.The carrier recovery system of claim 8, wherein the predetermined coefficient is a value less than one.
- [c10] 10.The carrier recovery system of claim 1, wherein the in-phase mixer comprises a third low-pass filter receiving the in-phase baseband signal for filtering out a high frequency term of the in-phase baseband signal.
- [c11] 11.A method of carrier recovery comprising:  
mixing an incoming signal with an in-phase reference signal to produce an in-phase baseband signal;  
mixing the incoming signal with a quadrature-phase reference signal to produce a quadrature-phase baseband signal;  
measuring a DC offset of the quadrature-phase baseband signal; and  
generating the in-phase reference signal and the quadrature-phase reference signal according to the DC offset of the quadrature-phase baseband signal.
- [c12] 12.The method of claim 11, further comprising locking the quadrature-phase reference signal and the in-phase reference signal to a selected channel in an Advanced

Television Systems Committee (ATSC) digital television (DTV) receiver.

- [c13] 13.The method of claim 11, wherein the quadrature-phase reference signal is the in-phase reference signal phase-delayed by ninety degrees.
- [c14] 14.The method of claim 11, wherein the incoming signal corresponds to a received vestigial sideband (VSB) signal.
- [c15] 15.The method of claim 14, wherein the DC offset of the quadrature-phase baseband signal is caused by to a pilot tone of the VSB signal for a selected carrier.
- [c16] 16.The method of claim 11, further comprising generating the in-phase reference signal and the quadrature-phase reference signal to minimize the DC offset of the quadrature-phase baseband signal.
- [c17] 17.The method of claim 11, further comprising filtering out a high frequency term of the quadrature-phase baseband signal.
- [c18] 18.The method of claim 11, further comprising filtering out a high frequency term of the in-phase baseband signal.
- [c19] 19.The method of claim 11, wherein measuring a DC offset of the quadrature-phase baseband signal com-

prises:

adding the quadrature-phase baseband signal and a feedback signal to produce an added value;

delaying the added value by a predetermined time; and

multiplying the delayed added value by a predetermined coefficient to produce the feedback signal.

[c20] 20. The method of claim 19, wherein the predetermined coefficient is a value less than one.